

The CHICAGO NATURALIST



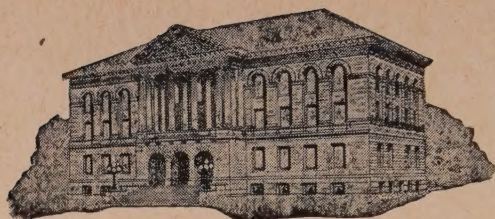
Published by

THE CHICAGO ACADEMY
OF SCIENCES

VOL. 9 • NO. 4



DECEMBER • 1946



THE CHICAGO ACADEMY OF SCIENCES

LINCOLN PARK - 2001 NORTH CLARK STREET

NATHAN S. DAVIS, M. D., *President*
 JAMES P. SIMONDS, M. D., *Vice-President* KENNETH A. REID, *Vice-President*
 NAT T. BURFEIND, *Secretary* WALTER A. GRAU, *Treasurer*
 HOWARD K. GLOYD, Ph.D., *Director of the Museum*

BOARD OF TRUSTEES

Henry B. Babson William D. Cox Nathan S. Davis, M. D.
 Walter A. Grau W. F. Henderson, Ph.D.
 Burt A. Massee Lewis C. Walker

Honorary Trustees

F. R. Dickinson Hulburd Johnston Eugene H. Garnett
 Thomas D. Heed Lloyd A. Laflin
 John Nash Ott, Jr. Carroll H. Sudler
 President of the Chicago Park District, *ex officio*

BOARD OF SCIENTIFIC GOVERNORS

John R. Ball, Ph.D. Nathan S. Davis, M. D. Alfred Emerson, Ph.D.
 Charles E. Olmsted, Ph.D. Orlando Park, Ph.D.
 C. L. Turner, Ph.D. Hanford Tiffany, Ph.D.
 James P. Simonds, M.D. Nat T. Burfeind
 Superintendent of Schools, *ex officio*
 Presidents of Affiliated Societies, *ex officio*

AFFILIATED SOCIETIES

State Microscopical Society of Illinois
 Illinois Audubon Society Chicago Entomological Society
 Marquette Geologists Association
 Burnham Astronomical Society

The Chicago Naturalist



Published four times a year by
THE CHICAGO ACADEMY OF SCIENCES
Lincoln Park - 2001 North Clark Street
CHICAGO 14, ILLINOIS

VOLUME 9

DECEMBER, 1946
(Published February, 1947)

NUMBER 4

Contents

The Dells and Devils Lake Region, Wisconsin <i>William E. Powers</i>	75
Some Rattlesnake Dens of South Dakota <i>H. K. Gloyd</i>	87
Museum Activities	98
The Naturalist's Book Shelf	100
Index for Volume 9	102



Hornets Nest, a remarkable feature due to differential weathering of Potsdam sandstone near head of Dells.

The Dells and Devils Lake Region, Wisconsin

WILLIAM E. POWERS*

The Devils Lake and Dells region of Wisconsin has long been popular with both layman and scientist. Thousands visit this area every year to enjoy the picturesque cliffs and cool, shady glens of the Dells, and the spectacular pinnacles and rock slides of Baraboo Range at Devils Lake. Amidst the flat, monotonous prairies of the Middle West, these canyons and subdued mountains stand out in charming contrast. Among the visitors are many students of natural science. Botanists study ferns and lichens in the shady canyons, northern evergreens which mingle here with deciduous trees from the south, and the curious "relic plants." The latter belong to a colder climatic zone, but were driven southward to this area during glaciation and still remain here in cool, sheltered locations, although their proper vegetative zone has long since retreated to the north. Geologists study the massive sandstone beds in which the Dells are eroded, the ancient and highly deformed rock formations of Baraboo Range, the iron deposits within Baraboo basin, and the history of the mountain gorge in which Devils Lake now lies. Geographers find their greatest interest in the striking contrasts between the glaciated plains on the east and the unglaciated Driftless Area on the west.

The following pages summarize the broader geological and geographical features of the region. Few localities in our country reveal so clearly their geological structure and history, and few bring home so clearly the manner in which continental glaciers have altered the northern United States and have affected man's opportunities for gaining his living therein.

The writer believes that many visitors to the Dells and Devils Lake will be interested in understanding the story which the picturesque landscape has to tell. Rock formations with their entombed fossil remains indicate conditions and events in past ages of earth history. Landforms and the stones or other loose materials strewn on their surface also give us a clue to conditions in the recent past—recent in terms of earth history rather than human history. It is the writer's purpose to show how the rocks and landscape features at the Dells and Devils Lake reveal their origin. It is hoped that such an understanding will enhance the visitor's enjoyment of the region.

Many of the ideas presented herein were not originated by the writer. Most of the general facts are given in the references listed. Other concepts have been worked out by scientists from Northwestern University, the University of Wisconsin, and other organizations, and have been

*Department of Geography, Northwestern University.

presented during field conferences in the region. To all such persons the writer acknowledges his debt.

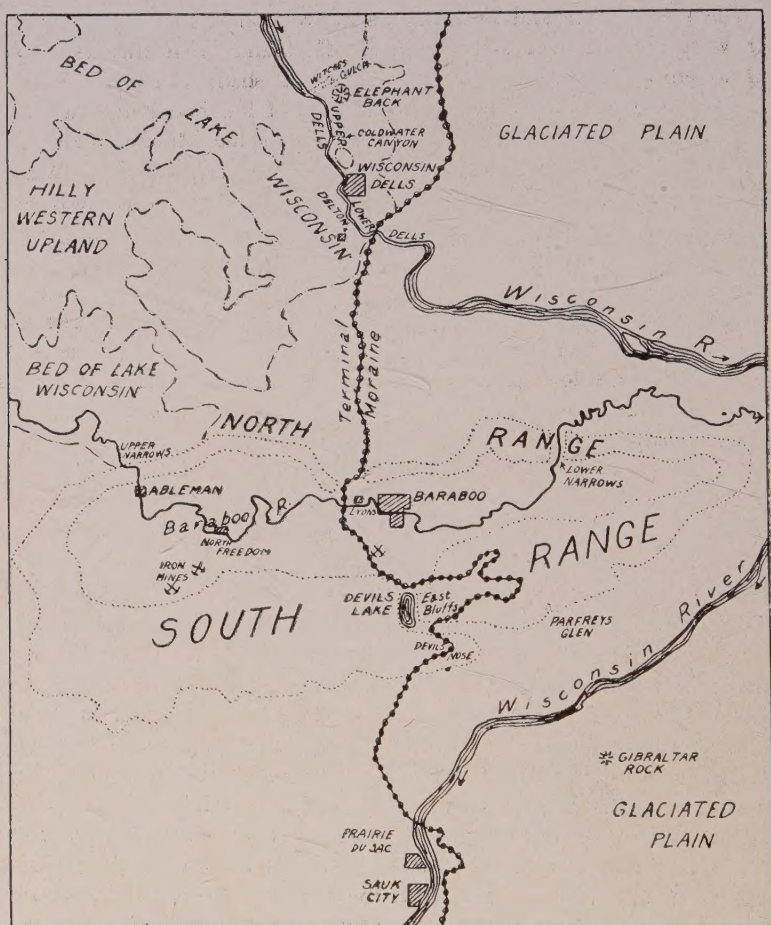


Figure 1. Map of the Dells and Devils Lake area, Wisconsin.

PHYSICAL GEOGRAPHY

The Dells and Devils Lake Region lies in south-central Wisconsin, about 50 miles northwest of Madison. The landscape is dominated by Baraboo Range, an elongate oval ridge some 25 miles long from east to west, enclosing a basin in which the town of Baraboo lies. The south part of Baraboo Range is known as South Range, and forms a flattish

upland three to five miles wide in places, and rising to 1560 feet just east of Devils Lake at "East Bluffs" (Figure 1). South Range stands 600 to 700 feet above the rolling plains country on its south. North Range (Figure 1) is lower and less continuous. From one to two miles broad, it rises from 100 to 500 feet above the lowlands on its north.

Three notches permit entry into the Baraboo basin. At the northwest a narrow water gap in North Range admits tiny Baraboo River, which leaves the basin through Lower Narrows, a large flat-floored valley in North Range at the northeast. In South Range a large L-shaped gorge contains Devils Lake, a beautiful water-body half a mile by a mile and a quarter.

Wisconsin River approaches Baraboo Range from the north, but turns eastward and circles the range to a point south of Devils Lake, from which its southward course is resumed. There is evidence that formerly the Wisconsin River flowed through Lower Narrows into Baraboo basin and thence through the Devils Lake gorge.



Figure 2. The "Jaws," a part of the Dells of Wisconsin River.

The Dells are a deep part of the Wisconsin River channel near where the river turns eastward, from six to twelve miles north of Baraboo Range (Figures 1 and 2). In striking contrast to the broad, open Wisconsin River valley elsewhere, the Dells are narrow and "youthful" in aspect, and beyond question represent a new portion of the river's course.

West of the Dells lies a rough and hilly upland which stretches northwestward from the Baraboo Range. East of the Dells and south of

Baraboo Range stretches a rolling plain, marked by low rounded hills and in many places by swamps and lakes. This undulating plain was rubbed over by a continental glacier during the Great Ice Age, but glaciation failed to reach the hilly western upland. The glacial margin is marked by an irregular belt or ridge of glacial drift known as a terminal moraine, the position of which is shown on Figure 1. This moraine can be traced across Lower Dells and North Range to near Devils Lake, where it makes a long loop eastward about high summits east of the lake, which retarded glacial advance from the east. The ridge then swings westward and descends the slopes of Devils Nose to the southern plains. East of this moraine, swamps and small lakes abound, stones of types foreign

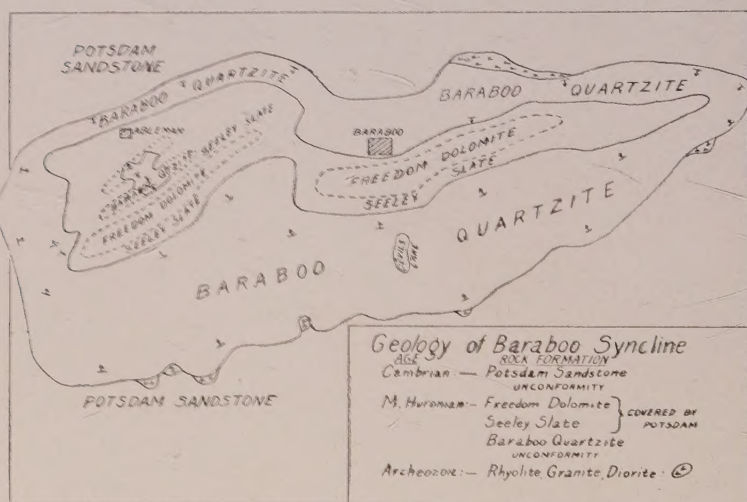


Figure 3. Map of bedrock formations of Baraboo Range area.

to this area strew the ground, and the land surface has been smoothed by a mantle of glacial "drift," a mixture of clay, finely ground rock, sand, gravel and larger stones. West of the moraine, glacial drift as described above is absent, the land is generally rougher, and soils have been derived from the underlying sandy bedrock. An exception to this statement is the flat sandy plain which stretches many miles northwestward from the Dells past Mauston and Camp Douglas. This is the bed of ancient Lake Wisconsin, a lake formed when the glacier blocked the upper Wisconsin River.

The principal towns of the area are Baraboo (5,500), North Freedom (550) and Ableman (470) within Baraboo basin; Wisconsin Dells (1490), formerly called Kilbourn, on the Dells; and Prairie du Sac (950) and Sauk City (1130) on the Wisconsin River south of Baraboo Range. These towns arose in association with various activities: lumbering on Wisconsin River when Wisconsin was a leading lumber producer, farming in the surrounding region, water power development at Prairie du Sac and Wisconsin Dells, and the tourist trade. During World War II, the Badger Ordnance Works near Prairie du Sac has swelled population in that town and Sauk City.

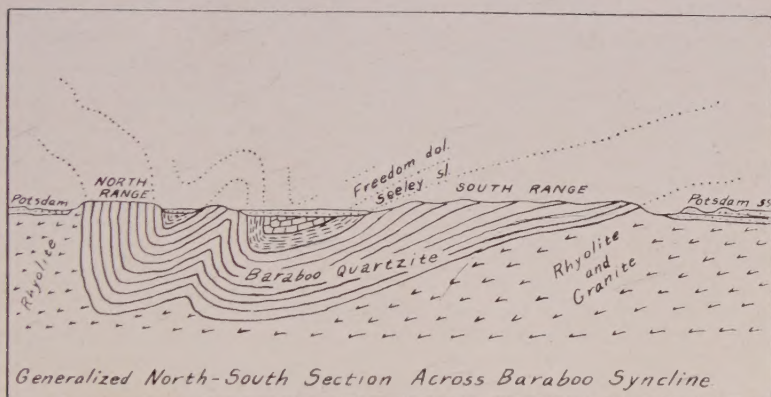


Figure 4. Generalized north-south section across Baraboo Range.

THE ROCK FORMATIONS

Baraboo Range is a great trough-like structure of very ancient rocks known as the Baraboo quartzite, Seeley slate, and Freedom dolomite. These three rock formations were originally laid down as sediments in a sea during the ancient Huronian period, probably at least a billion years ago. They rest on what was then a sea-bottom of still older rocks—volcanic rhyolite, now exposed near Lower Narrows and Devils Nose, and granite and granite-like rocks now found in a few obscure places at the foot of South Range (Figure 3). On this ancient rocky sea bottom accumulated 5,000 feet of Baraboo sand, 500 feet of Seeley mud, and a like thickness of Freedom limy sediments. In time the sand was cemented by iron oxide to form red or purplish sandstone, and that in turn was cemented by silica into the very sordid purplish quartzite that now forms the Baraboo Range. The muds and limy sediments were also consolidated to form rocks known as slate and dolomite, respectively. In time the region must have been subjected to great compressive forces

from north and south, for these three rock formations now form a gigantic double fold running east-west, of which North and South Ranges form the upturned edges of the massive, resistant Baraboo quartzite (Figure 4). It is very probable that other folds were formed also, making the Baraboo area a great mountain chain similar to parts of the Rocky Mountains. But if so, all of these mountains were later destroyed by erosion save the Baraboo Range. Downfolded into the basin structure of quartzite are the weak beds of Seeley slate and Freedom dolomite, preserved there from the erosion which stripped them away elsewhere. The Baraboo Range is but the root of much higher mountains and indicates clearly a vast work of erosion, carried on by the streams, wind, ice, and other destructive agencies of that remote geologic period.

When were these ancient mountains eroded away? An answer is given by the relations, to the folded Huronian rocks, of the next rock series. Underlying the Dells, western hilly upland, and plain east and south of the Baraboo Ranges is a series of sedimentary rock beds nearly horizontal in position. Resting directly on the eroded folded Huronian formations described above is the Potsdam sandstone series. This consists chiefly of sandstone, with some dolomite, shale (a rock made from mud or clay), and conglomerate (pebbles cemented together). These beds were originally at least 700 feet thick near the Dells, and were deposited in a sea in the late Cambrian geologic period, as shown by their fossil remains. There is evidence that the Cambrian period occurred half a billion years ago. Although the earth was already old, organic life was simple, and the highest animals were then the trilobites, small crab-like organisms whose fossil remains occur in the Potsdam sandstone.

The Potsdam sandstone indicates when the ancient Huronian mountains were formed. The Potsdam is horizontal, but rests on eroded, folded Huronian beds, thus indicating that the latter were compressed into mountains and these eroded away, *before* the Cambrian period. Therefore the Baraboo Range is old—far older than the Alps, Cascades, Sierra Nevadas, or Rockies, older even than the Appalachian Mountains of the eastern United States.

The Potsdam sediments are but the bottom beds of a thick pile of rock strata that were deposited in geologic periods following the Cambrian. These include the Prairie du Chien dolomite and St. Peter sandstone (Ordovician period) both of which occur above the Potsdam in Gibraltar Rock (Figure 1), and several other formations up to and including the Niagaran dolomite of Silurian age, which is the underlying bedrock in Chicago. These beds buried the Baraboo Range, but have since been largely stripped away by erosion which has developed valleys, hills, and plains, but has left the resistant ancient Baraboo Range standing once more high above its surroundings.

Many of these relationships the visitor may see for himself. Horizontal Potsdam sandstone is beautifully displayed in the Dells, Elephant's Back (Figure 1), and at many other points both outside the Baraboo Range and within Baraboo basin. A beautiful conglomerate phase of the Potsdam, with red and purple quartzite pebbles, occurs in Parfrey's Glen on South Range (Figure 1). The relationship of Potsdam sandstone to Baraboo quartzite is particularly well shown at a point on East Bluffs known as Elephant Rock (Figure 1). Here an upper cliff is composed of white sandstone in horizontal layers which grades downward



Figure 5. Stand Rock, a table-topped erosion feature at head of Dells.

into a coarse conglomerate containing quartzite boulders several feet in size. This conglomerate in turn rests on an eroded surface of Baraboo quartzite beds inclined toward the north. One can imagine how waves of the rising Cambrian Sea gnawed at cliffs of the protruding quartzite mountain-island, and covered the boulders thus dislodged with sands that eventually buried the range. Another excellent display of the sandstone-quartzite relationships is in the Upper Narrows at Ableman where horizontal beds of sandstone and conglomerate end against or rest on top of the eroded vertical quartzite layers that compose North Range. This type of structure, where sedimentary rock beds rest on the eroded surface of older rocks, is called an *unconformity*. No better examples can be seen than those at Elephant Rock and Ableman.

Figures 3 and 4 deserve further comment. The pre-Huronian basement of rhyolite and granite shown in Figure 4 is largely inferred, al-

though these rocks are exposed at the points indicated in Figure 3. The great downfold of Huronian formations is called the Baraboo *syncline*. This syncline appears to be complicated by one or more minor *anticlines* or upfolds in its center (see also Figure 3). Seeley slate and Freedom dolomite are not generally exposed in Baraboo basin as shown in Figure 3, but are known from drill holes through their cover of Potsdam sandstone. At North Range the Baraboo quartzite is vertical but in South Range the quartzite slopes or *dips* northward at a small angle.

DEVELOPMENT OF PRESENT SURFACE FEATURES

It is hoped that the reader now understands how the ancient Huronian Baraboo Range was buried under Cambrian and later marine sedimentary formations, and during subsequent uplift has been exhumed by erosion of its sedimentary cover. Let us now consider how the region looked when the glacier began its invasion from the east. A study of depths to bedrock in wells of the glaciated plain (Figure 1) indicates that the original land surface resembled the unglaciated hilly upland now on the north and west, and that the glacier has smoothed the surface by filling valleys. Further, well records disclose a large drift-filled



Figure 6. West Bluffs at Devils Lake. Slide of loose talus stones at base of quartzite cliffs.

valley—the preglacial Wisconsin River—that leads eastward *north* of Elephant's Back (Figure 1) and then turns to the south, passing through Lower Narrows, Baraboo basin, Devils Lake gorge, and south to the present Wisconsin valley. Therefore, Wisconsin River in preglacial time flowed through the ranges in watergaps which today are occupied by

tiny Baraboo River and Devils Lake, respectively. How did Wisconsin River acquire a course so contrary to present landforms? For an explanation, we have but to remember that Baraboo Range was once buried



Figure 7. Devils Lake, lying in the ancient gorge of the Wisconsin River.

under a pile of marine sedimentary beds that included Niagara dolomite of the Silurian period. As the area later rose from the sea, it presented a flat surface on which Wisconsin River began its southward course. As the land continued to rise, Wisconsin River cut down through the sedimentary formations and eventually sawed its way across the buried quartzite range beneath. As millions of years elapsed, the weaker sedimentary beds were stripped to a lower level than Baraboo Range, but Wisconsin River retained its transverse course through the latter. Ultimately its valley became even deeper than the present Devils Lake Gorge, for a well near Devils Lake penetrated 283 feet of gravel and sand without reaching the bottom of the preglacial valley (Figure 7).

This situation was rudely disturbed by advance of a continental glacier from the east, a few tens of thousands of years ago. A terminal moraine or ridge of glacial drift was built at the limit of glacial advance, shown in Figure 1. East of this limit, hills were rounded by glacial scour, valleys were partly filled with drift, and undrained basins or flats left which later became lakes or swamps. Wisconsin River north of Baraboo Range was blocked and a large lake—glacial Lake Wisconsin—stretched for many miles northwestward from the Dells. At its highest level (960

feet) Lake Wisconsin covered all the present Dells area save the higher hills, and its sandy, silty sediments may be seen in some of the road cuts near Wisconsin Dells. The terminal moraine may be observed as a sandy, wooded ridge lying parallel to, and east of, U. S. Highway 12 between Lyons and Delton. Just north of Lyons, the moraine swings southwestward and forms a high ridge, in which the road cut displays a heterogeneous mixture of boulders, pebbles, sand, and finely ground rock—typical glacial drift. The road west from Lyons crosses this moraine one-quarter of a mile west of U. S. Highway 12.

Farther south the moraine swings eastward, forming a rolling hilly barrier just north of Devils Lake. Farther east it loops around two high summits on South Range that retarded ice advance (Figure 1) and then returns westward across the south end of Devils Lake gorge. Thus Devils Lake lies in an ancient river valley, blocked at both ends by glacial moraines. It is astonishing that the glacier did not close completely upon and fill the center of the gorge, so closely did the two walls of ice approach each other. Surely few lakes in the world have had so strange a history.

When the great glacier melted, perhaps 25,000 years ago, the Dells came into being. Preglacial Wisconsin River valley north of Elephant's Back was now filled with thick moraine, and waters of Lake Wisconsin drained southeastward across the flattish area lying west and south of Elephant's Back. Erosion must have been rapid, because Potsdam sandstone is soft and friable, and the volume of water from Lake Wisconsin was large. By rapid down-cutting the narrow, slot-like valley known as the Dells was formed. During its turbulent descent through the Dells, the Wisconsin River has altered its course several times. Its latest abandoned channel runs from the mouth of Coldwater Canyon to the site of historic Dells House, and is pointed out by boatmen on the river. The new channel between the points just mentioned is the swiftest and deepest part of the Dells. At a spot called the Narrows the river is less than 50 feet wide but thrice that depth.

About 1910 a power development dammed Wisconsin River at Wisconsin Dells, and raised by some 30 feet the level of water in the Upper Dells. Although this has reduced the height of scenic features above river level, it has rendered all parts of the Dells accessible to river boats, even tributary Coldwater Canyon.

The scenery and land surface of the region present many features of interest to the visitor. For example, rocky cliffs in the Dells show how rock decay and erosion are guided by internal structures in the rock. These cliffs of Potsdam sandstone tend to crumble as the cementing materials between sand grains are dissolved out by moisture seeping through the ground. Unequal resistance to this process by individual layers in

the rock causes the firmer beds to stand out in relief (Figures 5 and frontispiece). The process reveals not only the horizontal position of the major beds, but also inclined minor beds that constitute a structure known as cross-bedding. At certain places, such as Swallow Cliff, crumbling has caused small pits or holes in which swallows make their nests.



Figure 8. Dells (in foreground) and abandoned former channel of Wisconsin River (in background) near mouth of Coldwater Canyon.

The bedrock of the Dells is cut by many vertical or steep cracks, called *joints* by the geologist. These weaken the rock and hasten crumbling and erosion. Firm unjointed pillars, as Chimney and Stand Rocks, may remain standing while weaker jointed rock is removed from around them (Figure 5). On the other hand, particularly firm or massive beds tend to form projecting ledges, or in places, narrow constrictions in valleys. The projecting tabular top of Stand Rock is due to a thin firm layer, while a narrow part of the Dells known as the Jaws is due to a massive, resistant phase of the sandstone (Figure 2).

Artists Glen, Coldwater Canyon, and Witches Gulch are tributary to the Dells from the east. All are narrow, deep canyons where they join the main valley, and the latter two contain remarkable bowl-shaped chambers 10 or 15 feet in diameter and up to 25 feet high, connected by narrower passageways, such as "Fat Man's Misery." These openings, called *pot-holes*, were ground out by circular whirls or eddies in the stream which eroded the canyon. These pot-holes are lined up along large joints in the sandstone, and were eroded in succession as the canyons were ex-

tended headward. These same three canyons show another remarkable feature: their heads broaden out into valleys. These valley heads lie near the terminal moraine which fills the preglacial Wisconsin River valley. It seems likely that these valleys once opened eastward to the former river course, and that their present narrow lower canyons are postglacial, eroded concurrently with the Dells.

Potsdam sandstone crumbles into a sandy, infertile soil, as shown in the area about Wisconsin Dells. Many road cuts and other exposures in the unglaciated section show firm bedded sandstone below grading upward into loose sandy surface soil. Within the area formerly covered by Lake Wisconsin, a few granite and other foreign boulders may be found. These were probably floated to their present positions by icebergs in Lake Wisconsin.

Among the charming scenic features at Devils Lake are the great rock slides of East and West Bluffs (Figure 6). These are composed of angular, red or purple quartzite blocks, loosened from the rocky cliffs above, that have slid down to form gigantic *talus* slopes. The lower walls of Devils Lake Gorge are largely mantled by this talus, but near the top are vertical, angular rocky cliffs. Some of these cliffs have assumed queer or fantastic forms, as Turk's Head and Devil's Doorway. Above the cliffs, the purple quartzite shows ripple-marked surfaces and layers of white quartz pebbles, features which betray its origin as sandy sediment in the ancient Huronian Sea. A perplexing feature on East Bluffs is the presence of small pot-holes worn in the resistant quartzite by some former stream. Today this point is high on Baraboo range and a large stream would be impossible here.

Thus the visitor to Devils Lake and the Dells finds at every turn features of geographic and geologic interest, many of which illustrate fundamental principles in those sciences. It is hoped that this brief sketch of the region will add to the visitor's interest in and appreciation of the many striking things that he sees.

REFERENCES

Salisbury, R. D. and W. W. Atwood

1900 The geography of the region about Devils Lake and the Dells of the Wisconsin. Wisconsin Geol. and Nat. Hist. Surv., Bull. 5, p. 1-151.

Weidman, Samuel

1904 The Baraboo iron-bearing district of Wisconsin. *Ibid.*, Bull. 13, p. 1-190.

Martin, Lawrence

1932 The physical geography of Wisconsin. *Ibid.*, Bull. 36, ed. 2, p. 55-59; 328-353.

Smith, Guy-Harold

1931 Physiography of the Baraboo Range of Wisconsin. Pan-American Geologist, vol. 56, p. 123-140.

Some Rattlesnake Dens of South Dakota

H. K. GLOYD¹

Snake dens of fancy and fact have long been a part of American folklore and natural history, but few naturalists have had opportunities for observing them under favorable conditions. Dens, as the word is used here, are the cavities in the ground or among rocks in which the snakes retire in the fall and find a suitable place to spend the winter. Dens are essential to the snakes of northern latitudes for the more severe the winters, the more important it is to the snakes to get protection from low temperatures: even a hibernating snake can not survive prolonged freezing.

Usually the snake collector hears of an alleged den and visits the locality when he can. More often than not, conditions are not right; it is too early or too late, too warm or too cool. When the snakes emerge from winter quarters in the spring, they apparently do not stay long in the immediate vicinity of the den. Intent upon food, they spread out, a few at a time, into surrounding territory, provided the weather remains sufficiently warm. When, stimulated by lowering temperatures, they return to the dens in the fall, they may enter the cavity for a time, but on warm days often emerge again to lie in the sun for an hour or two. In some regions, colonies of several hundred snakes congregate in long-established dens. If one can time a visit nicely to such a den—be at the right place at exactly the right time—he may see more snakes than he would suppose could exist in a county-size area. Whether he enjoys it or not depends upon his point of view.

In eastern Kansas and southeastern Missouri during past years, I have seen aggregations of snakes, both in the spring and in the fall, in rocky ravines where crevices afforded adequate shelter during cold weather, but usually there were no large holes entering deep cavities. The snakes appeared to take refuge singly or in small groups in crevices more or less scattered throughout the length of the ravine or around the rim of a small hill. The one exception was near Irving, Kansas, in which eight or ten timber rattlesnakes² were collected one day in May in the vicinity of a hole in the sod—perhaps a woodchuck burrow—near a top of a sparsely wooded hill. Even during those days of frequent field trips I did not have the good fortune (this again depends upon the point of view) to find a large number of snakes at a den or at anything resembling a den. The nearest approach to a large

¹ Director of the Museum, Chicago Academy of Sciences.

² *Crotalus horridus horridus*.

catch in a short time was the taking of 28 copperheads,³ 23 timber rattlesnakes, and several non-poisonous species on April 20, 1926. This was in the course of three hours of hunting, which consisted mostly of lifting heavy limestone rocks with the help of three companions, and the place was a wooded, rocky ravine near Ottawa, Kansas. To find someday a *real* snake den, with millions—well, *hundreds* anyway—of snakes basking in the sun, became a suppressed desire—suppressed by force of circumstances.

It can readily be imagined, perhaps, how I read with extreme interest the many letters from A. M. Jackley describing his experiences with prairie rattlesnakes⁴ in South Dakota, a correspondence extending over more than fifteen years; how eagerly I listened to his telling of his work when we finally met a year ago; and how promptly I accepted his invitation to join him in the field last fall.⁵

Mr. Jackley is in charge of the rattlesnake control program of the South Dakota Department of Agriculture. He has observed the distribution and habits of rattlesnakes in that state for many years and is eminently qualified for his present work. In some parts of western South Dakota rattlesnakes are sufficiently numerous to be considered a serious menace to livestock (especially sheep), to ground-nesting birds, and to human life. When Jackley's success in locating dens and destroying snakes, at first on his own time and as a favor to ranchers, attracted considerable notice several years ago, he was persuaded to undertake the work on a larger scale under the auspices of the state. He has developed an efficient trap for catching snakes emerging from dens⁶ and has undertaken the task of training others in his methods of eradication. People throughout the state are interested. Maintenance men on the highways report "snake crossings" to Jackley's office in Pierre and the local radio station broadcasts instructions. The object of the campaign is to reduce the numbers of rattlesnakes where they are especially numerous so that danger from their venomous bites will be minimized. An attempt to exterminate them completely is not desirable and probably would be impossible.

The invitation to accompany Jackley on his fall round of visits to some of the dens included Thurston I. Wright of the Academy's department of preparations. Throughout the last two weeks of September Wright and I

³*Agkistrodon mokeson mokeson*, the northern copperhead.

⁴*Crotalus viridis viridis*, the only species of rattlesnake occurring in South Dakota.

⁵My point of view should be obvious by now.

⁶See "The Problem of Too Many Snakes," by H. K. Gloyd, *Chicago Nat.*, vol. 7, 1944 (1945), p. 87-97.



A catch of prairie rattlesnakes in South Dakota.
Photo by courtesy of A. M. Jackley.



One of Jackley's snake traps. A square of transparent mica, hinged at the top, covers entrance hole on the end of a wooden chute leading into the trap from an exit of the den.

spent much of our spare time (and some that was not so spare) repairing "pullmans" (as our shipping boxes for snakes have been called), overhauling our gear, greasing our high field boots (an important item), making some new gadgets for catching rattlesnakes safely, and packing our cameras and supplies. We wanted primarily to learn something about snake dens at first hand, to collect specimens for the Academy and the Lincoln Park Zoölogical Gardens, and—perhaps most of all—to make motion pictures in color of snakes at the dens. We dreamed of bringing back pictures of millions—pardon me, *hundreds*—of snakes piled up in stacks on sunny ledges, hurrying into the holes or standing up in high, challenging S-curves when disturbed. Jackley promised all this, and more—if conditions were right!

At last all preparations were made and, reading weather reports foot in the stirrup, we waited for the wire from Jackley saying "Now is the time!" In a few days it came. At the same time the radio at Pierre was sounding a trumpet call to ranchers throughout the Missouri Brakes: "The snakes are now at their dens!"

We reached Pierre by auto the night of October 1. Next morning was bright and warm. We set out with Jackley in his pick-up truck, its rugged motor taking us over good roads, bad roads, and no roads at all, to a den-site some fifty miles north where a trap was set on a hill overlooking the Missouri River. Prairie grass carpeted the hills with silky hues of yellow, purple, and pale red. The sturdy ash and stately cottonwoods along the streams were splendid in bright gold. Little pockets here and there were splashed with sumac crimson. Autumn was becoming fall.

En route it was explained to us that while the traps are designed for catching snakes emerging from the ground in the spring, they sometimes unexpectedly catch snakes in the fall. This is how it happens. The chute leading into the trap is set over the main exit of the den and all other possible exits or entrances are closed. However, bull snakes⁷ also enter the dens and, unlike rattlesnakes, are fairly expert burrowers. Their activities open up some of the plugged holes outside the trap and make entrances for the snakes returning in the fall. Some of these entering the newly opened holes emerge later through the main exit and are led into the trap. Just possibly this trap might have something.

The truck took us out on the prairie sod, over humps and bumps, over fences, around wash-outs, through thickets, and across ditches. It seemed able to do anything but climb a tree, and that was not needed. We stopped within fifty yards (Jackley would have said *three rods*) of the trap and approached quietly, Jackley cautioning us to look out for rattlers in the grass. Suddenly a husky buzz sounded a few yards away (about a rod!). It was a large

⁷*Pituophis sayi sayi*, a widespread, harmless species.

one, full of fight, "standing high" in an S-shaped curve, and ready for action. We slipped a strap-noose over his head, put him in a bag, and went on to the trap. Sure enough, it contained twenty-or thirty rattlers and two blue racers.⁸ That seemed like a lot of snakes to us, but Jackley said it was noth-



Thunder Butte, Ziebach County, South Dakota. Its sandstone cap shelters a famous snake den.

ing; now that they were moving he would show us millions — sorry, *lundreds* — before the day was over, if we were lucky. So we did not count them; a few rattlesnakes, more or less, were negligible now. We made some movies, boxed up the snakes, and set off again across the prairie.

Our next stop was a prairie dog town some 50 or 60 miles farther north which we reached in the early afternoon. Jackley knew of it only by hearsay but located it promptly and the fun began. The few prairie dogs in evidence when we approached vanished into their burrows and it seemed a deserted villiage indeed when we stopped the truck and walked a few yards — I mean *rods*. The snakes were lying singly or in groups up to twelve or fourteen in and around the entrances to burrows abandoned by the prairie dogs.⁹

⁸*Coluber constrictor flaviventris*. In this locality these snakes are brilliant bluish-green, with yellow bellies.

⁹The ancient and widespread story of the rodents and rattlesnakes living amicably together is, of course, a myth.

The technique here was to approach the burrow quietly to within a few yards¹⁰ and then run up quickly and flip the snakes out with one of Jackley's light but strong 3-tined rakes. This had to be done rapidly lest the alarmed snakes retreat out of reach. Once they were thrown into clear ground they were easily snared and "sacked up," although they usually attempted to regain the shelter of the hole. A half hour here yielded some thirty or forty snakes, more or less, and a bit of excitement, although my activities with the movie camera prevented full participation in the catching, a disappointment from a certain point of view.

We then drove about 20 miles southwestward and investigated a den consisting of a series of holes in the ground—possibly badger holes—around the rim of a small hill. The sun was low and the light unfavorable for color photography, a plausible excuse for leaving the camera behind and substituting one of our new gadgets for snake catching, of which Jackley took a dim view. Preceding us by a rod or so,¹¹ Jackley tossed the snakes out of the entrances of the burrows and down the hill. They rolled out in gobs, blobs, and basketfuls and immediately came back up the steep slope, rattling ominously and striking at the slightest provocation, in an effort to regain the shelter of the holes. Wright and I were very busy for a while, catching and sacking as effectively as we could and kicking the others down hill away from the den. Old stuff to Jackley; he stood on the rim, grinning and tactfully offering little comment. Some passers-by on horseback paused at a distance and watched, unsmiling. Again we made no count; rattlesnakes were a dime a dozen now. Tomorrow and the day after, and the day after that, we would have millions—or maybe *hundreds*.

We spent that night in a little town whose only hotel was out of water, but—as one of my friends puts it—water is for washing.

The sun was bright next day but the temperature noticeably lower. Jackley shook his head dubiously but decided to investigate some den-sites along the Moreau River. These were in cavities excavated by mammals—perhaps badgers again—in crevices formed by erosion and by the shifting of the stream banks when a section of bare soil loosens and slips. One area was deeply incised by erosion and full of holes apparently suitable for sheltering snakes. Jackley had found many rattlers here on other occasions but our score was zero. To embarrass us further we had an audience. Two or three carloads of people showed up to watch us do our stuff. The local press had stated that Jackley had a couple of "savants" with him and we were expected to put on a good show. But Jackley, wise to the vicissitudes of snake hunt-

¹⁰Approximately one rod!

¹¹I got it right this time!

ing, had made no unqualified promises, and Wright and I were not required to think up an alibi. Our visitors gave up and left in disgust, but not we.¹²

Pointed out to us from a distance was a high, sharp-angled hill called Pretty Creek Butte, just a few miles south of the Moreau River but accessible only by a long, devious, and difficult route even for the valiant pick-up. A den high on the point was of special interest, Jackley told us. A series of large holes was known to be occupied by a large colony. "This is the place," he said, "where ordinarily you could get the pictures you want. But boys, I think it's too cold!" We tried it anyway.



In the base of the notch is the main entrance of the big den at Thunder Butte.

Over the hills and fences again, across gullies, around rims that tilted the truck alarmingly sideways, and finally to the top of a high hump that overlooked a deep valley separating us from the butte. On foot now, down a steep slope and up again to the crest. The cameras got heavy but the thought of mil- (*hundreds*) of snakes shortly to be viewed through our lenses kept us puffing along. At the top of the crest we paused for breath. The den, Jackley told us, was only a few rods¹³ away; we must be quiet and care-

¹²"You don't have to be nuts, but it helps!"

¹³It's EASY now!

ful. But the breeze was cold and again he shook his head. We unpacked cameras, fixed bayonets—I mean fixed *tripods*—tock a reading with a light meter, calculated exposure time for Kodachrome film, and moved forward slowly, hopefully. Jackley, armed with his 3-tined hook, reached the first hole, an opening 12 or 14 inches in diameter and partly concealed by small bushes. Nothing. The second hole, and the third: no soap.

"Well here's *one!*" said Wright, behind me; a young-of-the-year less than twelve inches long. Meantime Jackley reached the fourth hole, the largest of the series. "Here's one, Doc! Take the rake and do your stuff!" Another young-of-the-year. Phooey.

Tracks in the dust indicated that snakes were there but the larger ones chose to stay underground. What the two silly babies were doing outside I can not guess. Shadows lengthend across the valley and the wind was sharp. It was obvious by then that no more snake hunting would be done that day. Jackley consulted his field thermometer. "That's all, boys," he said.

That night we listened to the story of Thunder Butte, infamous for its great snake den since the days of the early settlers of South Dakota. There we hoped to find our million rattlers, get a few thousand on movie film and a few hundred into sacks and boxes, but our spirits sank with the falling temperature. Jackley said, "We'll go there tomorrow so you can see the place, but I'll promise you no snakes unless it is warmer." We were tired enough to fall asleep quickly, but I remember wondering if I would dream of barrels of purple snakes with chartreuse rattles.¹⁴

Conical in form and topped by a flat layer of sandstone, Thunder Butte stands alone among the prairie hills, pontifical as Mount Aetna in the insurance ads. Viewed against a warm blue sky it might have a certain pristine charm but to us, approaching it on a cold, gray day with knowledge of the lithe and deadly creatures harboring beneath its sandstone cap, it had an air of sinister mystery. Who could tell what we might or might not find? Its steep slopes are strewn with great blocks of talus, some the result of natural weathering and some blown off by dynamite when attempts were made in earlier years to destroy the dens. A little more than half way up is a broad bench or shelf, also littered with large blocks of stone, on which Jackley said the snakes sometimes aggregate in the fall and linger for a while before going on to the dens above.

With light equipment we climbed the butte. The raw wind chilled our faces and bare hands; our heavy coats felt good. Along the edge of the bench we caught one medium-sized and four small rattlers, slow and sluggish in

¹⁴Once, before a snake hunt, I dreamed of a canyon full of black and yellow copperheads. Not bad!

their movements. Continuing on up to the vertical gash in the cap rock, we saw no more, but near the main opening of the den were several large ones recently killed by someone else. Well worn trails in the sandy dust, some even showing scale marks, evidenced the passing of many snakes. After satisfying ourselves that none were available to us here, we climbed to the top for a tooth-chattering view of the surrounding prairie. As so often happens, our change of luck came just as we prepared to leave. In a small sheltered "cove," probably blasted out of the rock, was another large opening leading back and



Three large rattlers were captured here. Those in foreground were killed by visitors a day or two earlier.

down into darkness. In the mouth of this tunnel, protected from the wind, were four large rattlesnakes. I tossed them out with a 3-tined hook, trying to emulate Jackley's expert technique, but one escaped. The other three, cold and sluggish, backed up against the wall rattling in slow motion, waving their black tongues, and drawing themselves up into striking position. After we put them in a bag, Wright and I took a closer look at the hole. Beyond and below in the Stygian darkness could be heard a sizzling chorus of many rattlers. Here at last was our million snakes! True, we didn't count them, but what's a few thousand, more or less?

We did not know it then, but this snake hunt was ended. As we descended the butte, the rain began; a rain that was to continue for hours, become chilled to sleet and snow, and develop into a storm that covered the entire territory we planned to visit tomorrow, the day after, and the day after that. Jackley estimated that probably no more than half the snakes in that area had by then assembled at the dens. We thought of the other millions - well, *thousands* of unfortunate laggards, hurrying home to warmth and safety, traveling more and more slowly as the cold air chilled their poikilothermous bodies. Perhaps some took temporary refuge in any handy mammal burrow and would have another chance to scale the side of Thunder Butte before the lethal cold of winter. Perhaps some were caught outside, too chilled to travel further, and were doomed to lie stiff and lifeless in the prairie



One of the entrances to the den at Thunder Butte.

grass that was their summer home. And what of the little fellows, the young-of-the-year, born in the valleys a few weeks before? They had never climbed the slopes of Thunder Butte. Some, perchance, started in time and found the way, but how? Could the others pass the winter in a mouse hole?

Our stormy drive to Buffalo was tough. Jackley managed to keep the truck on the slippery highway although one stretch, by a combination of dead

reckoning and black magic, was navigated across the prairie sod. We stayed right side up (others were less fortunate), got stuck only once, and reached our destination. Our boxes and bags of snakes stayed for three days under a snow-covered tarpaulin at near-freezing temperatures and survived. Jackley told us that a brief snowstorm commonly occurred at this time of year and was usually followed by a series of warm, sunny days during which snake hunting at dens would again be possible— and probably good.



Behind Jackley and Wright is another entrance to the den.
The snakes met death at other hands.

This storm proved exceptional. During the days and nights of hopeful waiting for it to pass, we spent many delightful hours discussing the habits and behavior of snakes, badgers, skunks, and men. From Jackley's vast store of field knowledge we learned much of interest and value. His anecdotes, told with sprightly, kindly humor, shortened the hours that could have dragged interminably. We did not make our movie of millions ah, *hundreds* of snakes piled up in stacks on sunny ledges, but there will be another time. Jackley assures us of a reserved seat in the valiant pick-up next season. Meantime, we shall think of more questions to ask, build more "snake-pullmans," invent new gadgets for field work, make some 3-tined rakes, put grease on our high boots, buy a couple wool shirts, and happily anticipate another whirl in a snake-hunter's heaven. It's all in the point of view.

Museum Activities

Lobby Exhibits

ANIMAL MINIATURES in brass and copper from many parts of the world were on display in the lobby of the museum from November 25 to January 18. The exhibit was part of a collection made over a period of thirty years by Mr. and Mrs. Sidney A. Teller of Chicago. Ranging from ancient Chinese seals to modern American pieces and representing all of the major groups of animals, the 186 miniatures attracted much attention from museum visitors. Children especially were intrigued by the series of tiny fishes, frogs, crocodiles, birds, horses, and elephants, and by the "charm bracelets" of intricate pattern and workmanship.

AN EXHIBIT OF MAHOGANY is currently featured in the lobby and will remain through March 5. Sponsored by George N. Lamb, secretary-manager of the Mahogany Association, Inc., this exhibit includes mahogany from the West Indies, Central and South America, and the West Coast of Africa; samples of 64 other rare and unusual woods from many parts of the world, mostly tropical regions; a series of mahogany carvings of unique charm, on public display for the first time; and a sample of the oldest mahogany existing in the world today.

Some of the more unusual woods, selected from Mr. Lamb's personal collection, one of the most extensive in the Middle West, are Amarillo (Venezuela), Brazilnut, Boxwood (North Africa), Cabbage Bark (Australia), Bubinga (West Africa), Cocoswood (West Indies), Greenheart (Surinam), Lacewood (Australia), Purple Heart (tropical America), Snakewood (Surinam), Rosewood (Brazil), Quebracho (Argentina), Tiger Wood (West Africa), Woman's Tongue (Honduras), Teak (Burma), Poisonwood (Florida), Mountain Cow (Honduras), and Camphor Wood (Formosa).

The carvings cover a wide range of subjects in human and animal forms. Many are originals by noted sculptors. Especially outstanding are "The Happy Fisherman," "Paul Bunyan," "The Snooty Butler," "Will Rogers," and "Fan Dancer." Among the animals the African lion—executed with exceptional skill and rightfully lording it over the wildcat, the bear, the mountain goat, and others—is king of the exhibit.

The seeds and bark of the mahogany tree are shown, a point of special interest since most people know mahogany only by its wood. For those interested chiefly in the wood are large panels illustrating the many figures for which the variety and beauty of mahogany is world-renowned, and the matched effects that may be obtained from highly figured mahogany veneers.

A group of pictures, reproduced from photographs, portray the mahogany tree in the jungle, the difficulties in felling it and transporting it, and the making of lumber and veneer.

Museum Visitors

Recent visitors to the Academy include M. Maldonado-Koerdell, Professor of Comparative Morphology, National School of Anthropology, Mexico, D. F.; Bernardo Villa Ramirez, mammalogist, Instituto Biologico, University of Mexico, Mexico, D. F.; James A. Honey, technician and taxidermist, Dyche Museum of Natural History, University of Kansas, Lawrence; Dr. Abgar Renault, Director General, National Department of Education, Rio de Janeiro, Brazil; Philip D. Evans, Kansas City, Mo.; A. M. Jackley, South Dakota Department of Agriculture, Pierre; and Margaret Patterson, Secretary of Science Clubs of America, Washington, D. C.

Winter Lecture Series

Audiences at the Sunday Afternoon Lecture series continue to exceed the capacity of the Academy's auditorium. The current series began January 5 and will continue through February 23. Each lecture is given at 2:30 and 4:00 o'clock.

During the fall series the entire auditorium at 4:00 P.M. was reserved for members. Since this arrangement did not meet with general approval, a plan formerly used was reinstated at the beginning of this year: Members of the Academy may reserve places for either program by writing or telephoning the Academy (LINcoln 0606) up to noon of the Saturday preceding each lecture. Reservations are held for members until time for beginning the program. Members are asked to limit their requests to two reservations per lecture.

It is requested that those in attendance do not bring children, since the size of the auditorium makes it difficult to accommodate the adult audiences for whom the Sunday lectures are designed. Special programs for children will be given again this year on Saturday mornings during April and May.

The full program for the winter series for 1947 follows.

Jan. 5: Our Western National Parks (natural color motion pictures), William R. Homan, Chicago.

Jan. 12: Bryce, Zion, and Grand Canyon National Parks (Kodachrome slides), Dr. C. O. Schneider, Winnetka.

Jan. 19: Our Heritage (color motion pictures of western United States and Canada), Norman R. Hallock, La Grange.

Jan. 26: The Canadian Rockies (color motion pictures), Victor H. Sickinger, Wilmette.

Feb. 2: From Geysers to Glaciers (Kodachrome slides), Dr. W. F. Henderson, Chicago.

Feb. 9: Wildlife in Australia (color motion pictures), Archibald Gilchrist, Melbourne, Australia.

Feb. 16: Lake Louise and the Columbia Ice Fields (Kodachrome slides), Charles E. Bacon, Chicago.

Feb. 23: The Sonoran Desert (Kodachrome motion pictures), Dr. Howard K. Gloyd, Chicago.

Personnel

Charlotte Kiewitz Boz, office assistant and bookkeeper since the fall of 1939, resigned November 30, 1946.

Mary E. Greig joined the Academy staff as recorder February 1, 1947.

Committee on Publications

Dr. C. L. Turner has been appointed to succeed Dr. John R. Ball on the Board of Scientific Governors' Committee on Publications. Other members of the committee are Dr. Alfred Emerson and Dr. Hanford Tiffany (chairman).

New Publications

Since the appearance of the last issue of *The Chicago Naturalist* the following publications have been issued:

"Revision of the Fifty-fourth Group of the Pselaphid Genus *Reichenbachia* (Coleoptera)," by Orlando Park, *Bulletin*, volume 7, number 13, pages 499-511, plates 1, 2, December 31, 1946, price 35 cents.

"The Terrestrial Form of the Newt, *Triturus viridescens*, in the Chicago Region," by Eliot C. Williams, Jr., *Natural History Miscellaneous*, Number 5, pages 1-3, January 17, 1947, price 5 cents.

The scientific publications of the Academy are available upon request without charge to active members. Others may obtain them at the nominal prices listed.

Volume 7 of the *Bulletin*, with a total of 511 pages, 1942-1946, is brought to a close with Number 13. A title page, table of contents, and index has been mailed to libraries and other institutions receiving all papers in this series.

The Naturalist's Book Shelf

CHARLES DARWIN AND THE VOYAGE OF THE BEAGLE

Edited with an Introduction by Nora Barlow

Philosophical Library, New York, N. Y., 1946, (6), 279 pages, bibl., index, 16 pls., 1 map. Cloth, \$3.75.

A series of thirty-nine letters, mostly hitherto unpublished, written by Charles Darwin to his family from Cambridge and London and from the *Beagle*, affords a nucleus of interest to which have been added extracts from his original notebooks, and the whole has been provided with an informative and sympathetic introduction. That this is a great service to our generation of naturalists is immediately evident on opening the book. The freshness of the reporting and the liveliness and informal intimacy of the letters from young Darwin, mostly to his sisters, afford glimpses into a mind so great in its later achievements, the development and education of which is of such transcendent importance to educational theory, that this slender volume is a most significant one. This book should, indeed, be brought to the attention of those educators who have reversed the Agassizian dictum and have rated the study of books above the observation and investigation of nature. Whether there is any hope of converting them from the brilliance of dialectic to the orderly systematization and generalization of scientific method may perhaps be doubted; too many educators at the university level believe that one learns to think in a classroom, and forget how the combination of leisure and stimulus of a voyage to exotic and romantic regions may affect an active mind, as they forget that one may learn to think behind a plow.

No one can now deny the historic importance of Darwin's life work in the history of human thought; and few can longer maintain that his influence was anything but good. There was a genera-

tion of scientists that decried the significance of Darwin's basic theory of natural selection, and who would be astonished to see how modern genetics has restored this principle to fundamental importance. And there have been educators who have denounced his supposedly materialistic influence and have bracketed him with, of all in-compatibles, Marx.

The reviewer long since reached the conclusion that *The Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage Round the World of H. M. S. 'Beagle' under the Command of Captain Fitz Roy, R. N.*, more commonly known as "A Naturalist's Voyage Round the World," is the greatest of all books of travel. We are fortunate to have a fine supplementary work, also prepared by Lady Barlow, in *Charles Darwin's Diary of the Voyage of H. M. S. 'Beagle.'* The new volume forms an addendum to the diary in its extracts from the notebooks, and supplements the life and letters.

Lady Nora Barlow, from her background as Darwin's granddaughter, provides a vivid description of the Wedgewood and Darwin homes, and so lays the foundation for an understanding of the drama of the decision to sail on the *Beagle*, during the days when "to go or not to go" was the question. The book is necessarily fragmented; but the fragments are significant and the whole sequence is a most welcome addition to Darwiniana, from the Preface with its list of editions of the *Journal* and other sources; the chapters of the Introduction describing "The English Scene," "Education," "The Offer," and "Captain Fitz Roy"; the thirty-nine letters, some of them especially moving and significant; the selected note-book entries; and finally, to the illustrations, mainly taken from the official narrative volumes.

Karl P. Schmidt

A NATURALIST'S SCRAPBOOK

By Thomas Barbour

Harvard University Press, Cambridge, Mass., 1946,
x, 218 pages, index, 17 halftones. Cloth, \$5.00.

To those familiar with the late Thomas Barbour's previous popular works, this book needs little introduction; and to those who have not read them it will form an excellent introduction to the popular natural history writing of a distinguished scientist and museum administrator.

This collection of entertaining essays is truly a scrapbook covering a wide range of interesting anecdotes about the acquisition of valuable collections for Harvard's Museum of Comparative Zoölogy and the men with whom the author was associated there; experiences with smaller museums such as the Boston Society of Natural History and the Peabody Museum of Salem. A chapter on zoögeography presents some of Dr. Barbour's views on the distribution of

animals and another deals with problems of museum exhibition, particularly the role of labels in exhibits. Several chapters consist of reminiscences of trips to the East Indies and the West Indies and of experiences collecting specimens for the museum on these trips.

Dr. Barbour has an easy, conversational style of writing which, at least in so far as this reviewer is concerned, leaves one with the feeling of having spent a very pleasant afternoon with the author in his "back office" at the Agassiz Museum. During the course of the afternoon he has recalled some of the men he has known and worked with, some of the places he has visited and the animals he has collected, and at the same time a few of his own pet theories have been brought into the conversation.

This volume should find a welcome place in the library of anyone interested in natural history.

Eliot C. Williams, Jr.

ENGLISH-FRENCH AND FRENCH-ENGLISH TECHNICAL DICTIONARY; metallurgy, mining, electricity, chemistry, mechanics, sciences.

By Francis Cusset

Chemical Publishing Co., Inc., Brooklyn, N. Y.,
1946, 590 p., appendix. Cloth, \$5.00.

This new technical dictionary seems to have been compiled primarily for use by physical scientists and engineers, and for them it should prove a helpful supplemental reference. Even in those fields, however, as the author himself attests with the inclusion of a 16-page word supplement, the compilation is in need of further amplification.

The book will not be of any particular value to natural scientists. Biological terms are but poorly represented.

The volume is conveniently sized, its typography and general format pleasing.

The English-French word lists precede the French-English in this dictionary. An appendix gives the conversion of weights, measurements, money, and similar information in the English and metric systems.

That mechanical errors have crept into a work of this kind is not surprising and is perhaps inevitable. Duplication of terms in the original and supplemental word lists, together with frequent instances of misplaced word order and misspelled words, are too numerous, however, to retain the confidence of the careful technical worker. Is it too much to expect the editors and publishers—particularly of a dictionary which will be used constantly as an authoritative reference—to take every possible precaution in eliminating errors of this sort?

Kathryn J. Stephenson.

Index to Volume 9

1946

An asterisk (*) indicates illustrations.

- Adams, C. C. 19
 Agkistrodon mokeson mokeson 88
 Allee, W. C. 27, 30
 Amateur Herpetologists Club 20, 41, 42, 43, 70
 Aphyocharax rubripinnis 37
 aquarium fishes 36-40
 Arboretum, Southwestern 41
 arnoldi, Copeina 38
 atrox, Crotalus 66
 Aztec botany and zoology, by M. Maldonado-Koerdell 50-58
 Babbitt, Lewis H. 70
 Babson, Henry B. 19
 Bacon, Charles E. 99
 Ball, John R. 20, *68, 99
 Review by 71
 Banks, Nathan 19
 berlandieri, Rana pipiens 67
 Bevan, W. A. 41, 42
 Bird-banding Conference 20
 Blanchard, Frieda C. 19
 Book Notices 48
 Book Shelf 21, 44, 71, 100
 Borneo 12-16
 Boz, Charlotte Kiewitz 42, 99
 Breder, C. M. 19
 Britton, Max E. 70
 Brues, C. T. 19
 Buchanan, J. W. 19
 Burfeind, Nat T. 19
 Burnham Astronomical Society 43
 calligaster, Lamppropeltis 63, 66
 Campbell, Sam 69
 Carlson, Margery C. 69
 Carnegieella strigata 39
 catenatus, Sistrurus 63, 66
 Characins as aquarium fishes, by F. H. Stoye 36-40
 Chicago Academy of Sciences
 Affiliated Societies 43
 Annual Meeting 19
 Bequests 19, 70
 Children's Programs 20
 Exhibits 20, 70, 98
 Lectures 42, 69, 99
 Museum Activities 19, 41, 68, 98
 New Members 19
 Personnel 19, 70, 99
 Publications 20, 42, 99
 Scientific Associates 70
 Chicago Entomological Society 43
 Chicago Herpetologists Club 70
 Chicago Park District 41
 Clausen, Lucy W. 70
 Cnemidophorus gularis 66
 sexlineatus 66
 Coluber constrictor flaviventris 66, 91
 comejean 7
 Community Trust 69
 Conant, Roger 20
 Copeina arnoldi 38
 copperhead 88
 cornutum, Phrynosoma 66
 Crew, Henry 19
 Crocodiles in Borneo, by Harry C. Raven *12-16
 Crotalus atrox 66
 horridus horridus 87, 88
 viridis viridis 66, 88, *89
 Crowell, Bowman C. 19
 Davis, Nathan S. 19
 Review by 21
 Dells and Devils Lake region, Wisconsin, The, by William E. Powers 75-86
 DuMont, Philip A. 70
 Dunlap, Robert G. 41
 eagle, bald 17
 Edgren, Richard A., Jr. 41
 Eggersted, Ray 69
 Eigsti, O. J., Review by 46
 Elaphe 67
 Elton, Charles 19
 Emerson, Alfred 19, 69, 99
 episcopa, Sonora 66
 Eumeces 67
 Evans, Philip D. 98
 fishes, aquarium 36-40
 flaviventris, Coluber constrictor 66, 91
 flicker 17
 Ford, E. R. 70
 Unusual nesting sites 17-18
 Froeschner, Elsie Herbold 62
 Fuller, George D. 10
 Garrison, Jane 19
 Gibson, Fred 41
 Gilchrist, Archibald 99
 glass-snake 67

- Gloyd, H. K. 41, 42, 66, 68, 99
 Review by 44
 Some rattlesnake dens of South
 Dakota 87-97
- Greig, Mary E. 99
- gularis, *Cnemidophorus* 66
- Gymnocorymbus ternetzi * 37
- Hallock, Norman R. 99
- Harper, Samuel A., The May fly 18
- Hartman, Carl G. 19
- hatchet fish, silver * 39
- Henderson, W. F. 99
- Hernandez, Francisco 53
- Hoff, C. Clayton 42
- Holbrookia lacerata 65
- Hollister, John Hamilcar 70
- Homan, William R. 99
- Honey, James A. 98
- horridus, *Crotalus horridus* 87, 88
- How the forest encroached upon the
 prairies of Illinois, by Amos Sawyer
 10-11
- Hyphessobrycon innesi 37, * 38
- Illinois Audubon Society 43
 innesi, *Hyphessobrycon* 37, * 38
 insect cases 41
- Jaeger, Fred H., Jr. 70
- Jackley, A. M. 19, 68, 88-97, 98
- Jan Joost ter Pelkwyk, * naturalist, by
 Margaret Morse Nice 26-35
- Johannsen Albert Tate and Anna
 Ormsby 69
- Kaucher, Jacqueline D. 70
- Khaya 3-9
- Kennicott Club 69
- Kiewitz, Charlotte 42, 99
- Kraus, Ezra 19
- Kummer, Anna Pedersen 70
 Review, by 22
- lacerata, *Holbrookia* 65
- Lamb, George N., The romance of ma-
 hogany 3-9, 98
- Lampropeltis calligaster 63, 66
getulus splendida 66
- Laskey, Amelia R., Watching a Carolina
 wren's nest 59-62
- lecontei, *Rhinocheilus* 63, 66
- Lee, Oliver Justin 19
- Leiopisma 67
- Lincoln Park Zoological Garden 68, 90
- lineata, *Salvadora* 66
- lizards 65, 66, 67
- ludovicianus, *Thyrothorus* 62
- MacLean, William P. 69
- mahogany * 2-9, 98
- Maldonado-Koerdell, M. 98
 Aztec botany and zoology
 50-58
- Marquette Geologists Association 43
- Martin, Isabelle Hollister 19, 70
- massasauga 63, 66
- Masticophis flagellum testaceus 66
- Mathieu, Auguste 69
- May fly, The (verse), by Samuel A.
 Harper 18
- Metcalf, Z. P. 19
- Mexico 51
- Midwest Museums Conference 69
- Miller, Robert C. 70
- Mittleman, M. B. 42
- mokeson, *Agkistrodon mokeson* 88
- Natural History Miscellanea 20, 42, 99
- nests, of birds 17-18
- Nice, Margaret Morse, Jan Joost ter
 Pelkwyk, naturalist 26-35
 Review by 45
- Northwestern University 43
- Ophisaurus 67
- ornata, *Terrapene* 66
- Ott, John Nash 69
- Palmer, Ralph S. 20
- Park, Orlando 20, 43, 99
 Review by 46
- Patterson, Margaret 98
- Peikert, Cecelia 19
- Phrynosoma cornutum 66
- Pituophis catenifer sayi 66
 sayi sayi 90
- Powers, William E. 70
 The Dells and Devils Lake re-
 gion, Wisconsin 75-86
- prairies, Illinois 10-11
- Pseudotriton 42
- Ramirez, Bernardo Villa 98
- Rana pipiens berlandieri 67
- rattlesnakes 63, 66, 87-97
- Raven, Harry C., Crocodiles in Borneo
 12-16
- Redfield, Alfred 19
- Reid, Kenneth A. 19
- Renault, Abgar 98

REVIEWS:

- Barbour, Thomas, A naturalist's scrap-book, by E. C. Williams, Jr. 101
- Barlow, Nora (ed.), Charles Darwin and the voyage of the Beagle, by Karl P. Schmidt 100
- Cussett, Francis, English-French and French-English technical dictionary, by Kathryn J. Stephenson 101
- Fleischer, Max, Noah's shoes, by Jean M. Williams 23
- Foster, Mulford B. and Racine, Brazil, (Orchid of the tropics), by Kathryn J. Stephenson 71
- Goldman, F., Public medical care, by Nathan S. Davis 21
- Louis Agassiz as a teacher, by E. C. Williams, Jr. 47
- Noble, Ruth Crosby, The nature of the beast, by Orlando Park 46
- Pratt, G. L., American garden flowers, by Anna Pedersen Kummer 22
- Shuler, Ellis W., Rocks and rivers of America, by John R. Ball 71
- Smith, Hobart M., Handbook of lizards, by H. K. Gloyd 44
- Summer, F. B., The life history of an American naturalist, by Margaret M. Nice 45
- Thorp, R. W. and W. D. Woodson, Black widow, America's most poisonous spider, by Orlando Park 21
- Tiffany, L. H., The study of plants, by O. J. Eigsti 46
- Rhinocheilus lecontei 63, 66
- Rocha-Lima, Henrique da 19
- Romance of mahogany, The, by George N. Lamb 3-9
- Ross, W. F. 19
- Salvadora lineata 66
- Sawyer, Amos, How the forest encroached upon the prairies of Illinois 10-11
- sayi, Pituophis catenifer 66
- sayi, Pituophis sayi 90
- Schmidt, Karl P., Review by 100
- Schneider, C. O. 98
- sexlineatus, Cnemidophorus 66
- Shattuck, Elaine B. 19
- Sickinger, V. H. 99
- Simonds, James P. 19
- Sistrurus catenatus 63, 66
- skinks 67
- Smith, Hobart M., Snake detection 63-67
- Snake detection, by Hobart M. Smith 63-67
- snakes 63, 66, 67, 87-97
- snake trap *89, 90
- Some rattlesnake dens of South Dakota, by H. K. Gloyd 87-97
- Sonora episcopa 66
- sparrow, chipping 17
- song 18, 27
- splendida, Lampropeltis getulus 66
- State Microscopical Society of Illinois 43
- stellatus, Thoracocharax *39
- Stephenson, Kathryn J., Reviews by 71, 101
- Stille, Walter T., Jr. 42
- Stoye, F. H., Characins as aquarium fishes 36-40
- strangler fig 6
- strigata, Carnegiella 39
- Swietenia 3-9
- macrophylla 4
- Teller, Sidney A. 98
- tergeminus, Sistrurus catenatus 66
- ternetzi, Gymnocorymbus *37
- Terrapene ornata 66
- tessellatus, Rhinocheilus lecontei 66
- testaceus, Masticophis flagellum 66
- Test your nature lore 16, 24, 43, 48
- tetra, black 37
- Thoracocharax stellatus *39
- Thunder Butte *91, *93, 94-97
- Thyrethorus ludovicianus 62
- Tiffany, Hanford 19, 46, 99
- Tint, Louis J. 69
- Turner, C. L. 19, 20, 99
- turtles 66
- Unusual nesting sites, by E. R. Ford 17-18
- Urbain, L. F. 19
- viridis, Crotalus viridis 66, 88, *89
- Wade, Evelyn 19, 70
- Walls, Gordon L. 19
- Watching a Carolina wren's nest, by Amelia R. Laskey 59-62
- Williams, Eliot C., Jr. 19, *41, 43, 69, 70, 99
- Reviews by 47, 101
- Williams, Jean M., Review by 23
- Wolfson, Albert 70
- wren, Carolina 59
- Wright, Sewall 19
- Wright, Thurston I. 20, 41, 68



Sell your camera to Bass

If you have any unused equipment Bass will pay you highest prices for it.

Don't let your idle equipment gather dust . . . turn it into cash at once.

But whether you BUY, SELL or TRADE you can always do better at Bass.



- GRAFLEX
- GRAPHIC
- LEICA
- CONTAX
- ROLLIFLEX
- as well as
complete 8 and 16 mm.
Cine equipment.



NATURALISTS' SUPPLIES

We offer a large selection of supplies for the biologist and the amateur nature student. These include air and water nets, insect pins, storage and display boxes, plant presses, herbarium paper, cyanide jars, vials, and many other items.

When writing for catalog or pricelist, please mention the materials in which you are interested.



GENERAL BIOLOGICAL SUPPLY HOUSE

Incorporated

761-763 East Sixty-ninth Place, Chicago 37, Illinois

MEMBERSHIP

in

The Chicago Academy of Sciences

helps support

The Museum of Natural History
Public lectures throughout the fall and winter months
Educational programs for young people
Extension work in cooperation with the schools and the
Chicago Park District
Field studies of local flora and fauna and expeditions to other
regions
Research by staff members
Publications, both technical and popular
Libraries, a children's library and a scientific library

Although the Academy is at present filling a definite place in the educational life of the Chicago Region, its resources are inadequate for the services it is potentially able to render. Those interested in advancing education in natural history are invited to help by supporting such activities through membership in the Academy.

PRIVILEGES OF MEMBERSHIP

All members of the Academy receive *The Chicago Naturalist* four times a year . . . Special announcements of lectures and other activities . . . Reserved seats for Academy lectures . . . Access to the study collections . . . Use of the scientific library and reading room . . . Cordial assistance from members of the museum staff in connection with studies or special interests.

MEMBERSHIP FEES

Sustaining	\$25 per year	Associate	\$3 per year
Annual	\$10 per year	Life Membership	\$100

THE CHICAGO NATURALIST

is available to institutions such as libraries, schools, clubs, and comparable organizations at a subscription price of \$1.50 per year.